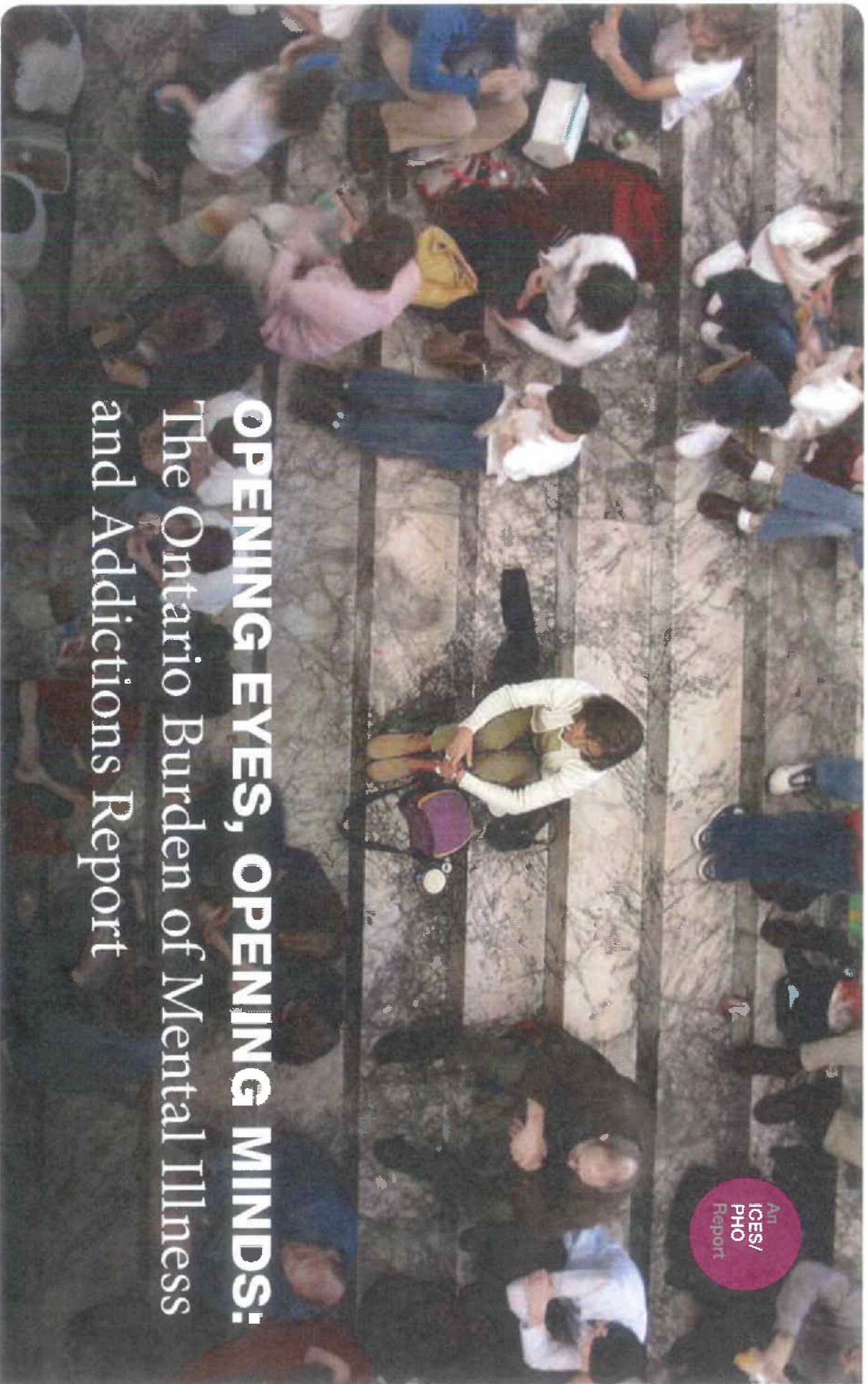


EXHIBIT 21



An
ICES/
PHO
Report

OPENING EYES, OPENING MINDS: The Ontario Burden of Mental Illness and Addictions Report

OCTOBER 2012

ICES Institute for Clinical
Evaluative Sciences

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|| OPENING EYES, OPENING MINDS: THE ONTARIO BURDEN OF MENTAL ILLNESS AND ADDICTIONS REPORT

An ICES/PHO Report

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CONTENTS

| 1

Publication Information

Authors' Affiliations	11
Acknowledgments	2
Other Studies	3
About ICES and PHO	3
List of Acronyms	8
List of Exhibits	9
	10

EXECUTIVE SUMMARY

4

CHAPTER 1 Introduction

11

CHAPTER 2 Methods

13

Disease List and Inclusion/Exclusion Criteria	14
Outcome Measures	14
Age groups	17
Time Frame	17
Data Sources	17

CHAPTER 3 Results and Interpretation

21

Mortality	23
Morbidity	24
Effect of Gender	24
Effect of Age	26
Comparing the Burden of Mental Illness and Addiction in Ontario to Other Burden of Disease Studies in Canada	27

CHAPTER 4 Specific Methods and Results by Mental Illness and Addiction

CHAPTER 5 Conclusions

56

CHAPTER 6 Development of the Severity Weights

APPENDIX A

58

APPENDIX B

APPENDIX C

61

Agoraphobia	30
Bipolar Disorder	31
Major Depression	33
Panic Disorder	35
Schizophrenia	37
Social Phobia	39
Alcohol Use Disorders	41
Cocaine Use Disorders	43
Prescription Opioid Misuse	45
	47

CHAPTER 7 Discussion

APPENDIX D

64

Relationship to Medical Comorbidities	49
Summary of the DALY/HALY Comparison	51
Study Limitations	53
Public Health's Role in Reducing the Burden of Mental Illness and Addictions	53
Overall Summary	54
	56

APPENDIX E Comparison of HALY and DALY Methodologies

67

REFERENCES

72

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OTHER STUDIES

This report was produced through a partnership
between the Institute for Clinical Evaluative
Sciences (ICES) and Public Health Ontario
(PHO). It is the final report in a three-part series
on the burden of disease and ill health in Ontario.
The first report, *The Ontario Burden of Infectious
Disease Study*, was released in December 2010.
The second report, *Seven More Years: The Impact
of Smoking, Alcohol, Diet, Physical Activity and
Stress on Health and Life Expectancy in Ontario*,
was released in April 2012.

Executive Summary

Most Ontarians are affected, either directly or indirectly, by mental illness and addiction issues. According to the Mental Health Commission of Canada, one in five Canadians is affected by a mental illness or addiction issue every year. Onset often occurs at a young age and can persist throughout life, with a significant impact on social connections, educational goals and workforce participation. The impact of mental illness and addiction on life expectancy, quality of life and health care utilization is significant—in many cases, more so than with other medical conditions—yet is often under-recognized.

The World Health Organization (WHO) defines

health as a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity. Mental health is a critical component of overall health. Measuring the burden of mental illness and addiction is an important step in ensuring that the needs of people who suffer from these conditions are understood and can be addressed. This study quantifies the burden and allows for comparison with other diseases and conditions.

The methods used in this study are conservative; they are based on a group of selected conditions and addictions that are highly prevalent and readily measured. Therefore, the findings do not reflect the total burden of mental illness and addictions in Ontario.

About This Report

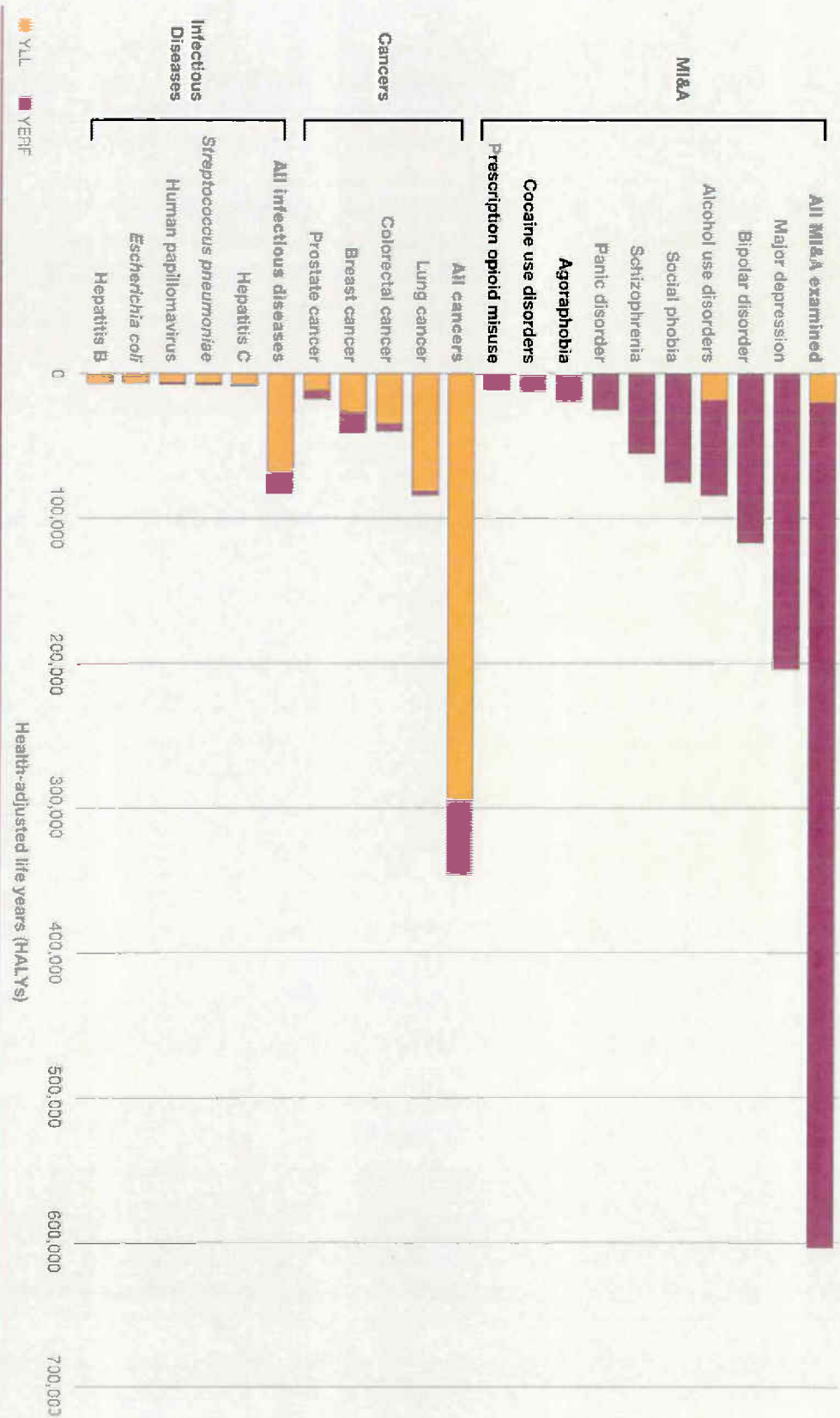
The Ontario Burden of Mental Illness and Addictions Report is the most thorough evaluation of the impact of mental illness and addictions on Ontarians to date. A joint project of the Institute for Clinical Evaluative Sciences (ICES) and Public Health Ontario (PHO), the study seeks to estimate the relative impact of a wide range of mental illnesses and addictions to inform priority setting, planning and decision-making by those involved in public health and mental health care planning.

Methods

The study used health-adjusted life years (HALYs), a composite health gap measure that incorporates both premature death (mortality) and reduced functioning or suboptimal states of health (morbidity) associated with disease or injury. HALYs quantify the amount of "healthy" life lost by estimating the difference between the health experienced within a defined population and some specified norm or goal. HALYs incorporate aspects of quality-adjusted life years (QALYs) and disability-adjusted life years (DALYs). HALYs are calculated by combining years of life lost due to premature death (YLL) and year-equivalents of reduced functioning from living with the disease (YERF).

Disease burden was estimated for nine mental illnesses and addictions for which reliable and valid Ontario data were available. Data on the nine conditions were acquired from a variety of data sources, including population health surveys and health administrative data. Deaths were obtained from vital statistics data.

Burden of mental illness and addictions (MI&A) compared to cancers and infectious diseases in Ontario, by years of life lost due to premature mortality (YLL) and year-equivalents of reduced functioning (YERF)



Findings

- The burden of mental illness and addictions in Ontario is more than 1.5 times that of all cancers, and more than seven times that of all infectious diseases.
- The nine conditions identified in this report contributed to the loss of more than 600,000 health-adjusted life years (HALYs), a combination of years lived with less than full function and years lost to early death in Ontario.
- Five conditions have the highest impact on the life and health of Ontarians: depression, bipolar disorder, alcohol use disorders, social phobia and schizophrenia.
- Depression is the most burdensome condition, with twice the impact of bipolar disorder, the next highest condition. The burden of depression alone is more than the combined burden of lung, colorectal, breast and prostate cancers.
- In terms of deaths, alcohol use disorders contributed to 88% of the total number of deaths attributed to these conditions and 91% of the years of life lost to dying early.

Conclusions and Recommendations

Ontarians experience a high burden of illness related to mental illness and addictions. Individuals may be encumbered by these illnesses at a young age, experiencing the disruption of important life transitions, and challenged by their ongoing burden over a long period of time.

The findings of this study underscore the need for effective collaboration between health care providers, practitioners, policy-makers and researchers to identify effective mental health promotion and mental illness and addiction prevention interventions and improve access to treatment for those suffering from mental illness and addiction. Early detection and timely intervention are critical in reducing the lifelong burden of these conditions.

While effective treatments exist for mental illness and addiction, only a small proportion of affected individuals receive them. Given the significant burden, there is a need to consider population-based prevention, promotion and treatment strategies aimed at reducing the burden of mental illness and addiction in Ontario.

8 | **ABOUT ICES**

Since its inception in 1992, ICES has played a key role in providing unique scientific insights to help policymakers, managers, planners, practitioners and other researchers shape the future direction of the Ontario health care system. Our unbiased, evidence-based knowledge and recommendations, profiled in atlases, investigative reports, and peer-reviewed journals, are used to guide decision-making and inform changes in health care delivery.

ABOUT PHO

Public Health Ontario (PHO) is a Crown corporation dedicated to protecting and promoting the health of all Ontarians and reducing inequities in health. As a hub organization, PHO links public health practitioners, frontline health workers and researchers to the best scientific intelligence and knowledge from around the world.

PHO provides expert scientific and technical support relating to communicable and infectious diseases; health promotion, chronic disease and injury prevention; environmental and occupational health; emergency preparedness; and public health laboratory services to support health providers, the public health system and partner ministries in making informed decisions to improve the health and security of Ontarians. PHO's work also includes surveillance and epidemiology, research, professional development and knowledge services.

LIST OF ACRONYMS

CAMH	Centre for Addiction and Mental Health	QALY	Quality adjusted life year
COHS 1.2	Canadian Community Health Survey Cycle 1.2	PHI	Population Health Impact of Disease in Canada
CIHI-DAD	Canadian Institute for Health Information Discharge Abstract Database	PHO	Public Health Ontario
CIHI-SDS	Canadian Institute for Health Information Same-Day Surgery database	WMH-CIDI	World Mental Health-Composite International Diagnostic Interview
CLAMES	Classification and Measurement System of Functional Health	WHO	World Health Organization
DALY	Disability-adjusted life year	YERF	Year-equivalents of reduced functioning from living with a disease or disability
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4th Edition	YLL	Years of life lost due to premature mortality
GBD	Global Burden of Disease study	YLD	Years of life lost due to disease or disability
HALY	Health-adjusted life year		
ICD-10	International Classification of Diseases, 10th Revision		
ICES	Institute for Clinical Evaluative Sciences		
MI&A	Mental Illness and addiction		
NACRS	National Ambulatory Care Reporting System		
OHIP	Ontario Health Insurance Plan		
OMHRS	Ontario Mental Health Reporting System		
ONBOIDS	Ontario Burden of Infectious Disease Study		

LIST OF EXHIBITS

Exhibit 2.1	Mental illnesses and addictions examined and their associated health states	Exhibit 3.7	Health-adjusted life years (HALYs) lost for selected mental illnesses and addictions in Ontario, by age group	Exhibit 4.9	Health-adjusted life years (HALYs) lost due to prescription opioid misuse in Ontario, by age group and sex
Exhibit 2.2	Data sources by year	Exhibit 3.8	Health-adjusted life years (HALYs) lost for selected mental illnesses, addictions, cancers and infectious diseases in Ontario, by years of life lost due to premature mortality (YLL) and year-equivalents of reduced functioning (YERF)	Exhibit A.1	Health status of selected mental illnesses and addictions, by severity weight and CLAMES attribute
Exhibit 3.1	Health-adjusted life years (HALYs) lost for selected mental illnesses and addictions in Ontario, by years of life lost due to premature mortality (YLL) and year-equivalents of reduced functioning (YERF)	Exhibit 4.1	Health-adjusted life years (HALYs) lost due to agoraphobia in Ontario, by age group and sex	Exhibit B.1	Diagnostic codes used to identify episodes of health care use
Exhibit 3.2	Number and proportion of deaths and years of life lost due to premature mortality (YLL) for selected mental illnesses and addictions in Ontario, by YLL ranking	Exhibit 4.2	Health-adjusted life years (HALYs) lost due to bipolar disorder in Ontario, by age group and sex	Exhibit B.2	ICD-10 codes used to identify deaths in the Ontario vital statistics data
Exhibit 3.3	Number and proportion of incident cases and year-equivalents of reduced functioning (YERF) for selected mental illnesses and addictions in Ontario, by YERF ranking	Exhibit 4.3	Health-adjusted life years (HALYs) lost due to major depression in Ontario, by age group and sex	Exhibit B.3	CCHS and CAMH Monitor indicators used to identify selected mental illnesses and addictions
Exhibit 3.4	Health-adjusted life years (HALYs) lost for selected mental illnesses and addictions among Ontario men and women	Exhibit 4.4	Health-adjusted life years (HALYs) lost due to panic disorder in Ontario, by age group and sex	Exhibit C.1	Disease model used for DisMod II
Exhibit 3.5	Deaths, years of life lost due to premature mortality (YLL), year-equivalents of reduced functioning (YERF) and health-adjusted life years (HALYs) lost for selected mental illnesses and addictions among Ontario men	Exhibit 4.5	Health-adjusted life years (HALYs) lost due to schizophrenia in Ontario, by age group and sex	Exhibit C.2	Epidemiological data sources for selected mental illnesses and addictions
Exhibit 3.6	Deaths, years of life lost due to premature mortality (YLL), year-equivalents of reduced functioning (YERF) and health-adjusted life years (HALYs) lost for selected mental illnesses and addictions among Ontario women	Exhibit 4.6	Health-adjusted life years (HALYs) lost due to social phobia in Ontario, by age group and sex	Exhibit D.1	Differences between health-adjusted life years (HALYs) and disability-adjusted life years (DALYs) in Ontario
		Exhibit 4.7	Health-adjusted life years (HALYs) lost due to alcohol use disorders in Ontario, by age group and sex	Exhibit D.2	Comparative ranking of selected mental illnesses and addictions in Ontario, by HALY and DALY methodologies
		Exhibit 4.8	Health-adjusted life years (HALYs) lost due to cocaine use disorders in Ontario, by age group and sex	Exhibit D.3	Years of life lost due to premature mortality (YLL) and years of life lost due to disease or disability (YLD) for selected mental illnesses and addictions in Ontario
				Exhibit D.4	Comparison of health-adjusted life year (HALY) and disability-adjusted life year (DALY) rankings for selected mental illnesses and addictions in Ontario

Introduction

The World Health Organization (WHO) defines health as a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity, and as “a resource for everyday life.”^{1,2}

This well accepted characterization positions mental health as a critical component of overall health.³ If there is “no health without mental health,”⁴ it follows that public health and mental health professionals may wish to act together to reduce the burden of mental illness and addiction (MI&A). A shared understanding of this burden in Ontario presents an excellent starting point for coordinated action across systems and sectors. The purpose of this study is to measure the burden of MI&A in Ontario using a consistent methodology that allows for comparison with other diseases and conditions.

In the original Global Burden of Disease study (conducted jointly by WHO and The World Bank), methodologies were developed to measure

and compare disease burden across different conditions. From the study’s earliest publications, there was a recognition that illness burden from neuropsychiatric disorders generally, and unipolar major depression specifically, was highly prevalent and significant, but under-recognized. Moreover, WHO has projected that depression will be the second leading cause of disability by 2020,⁵ and other mental illnesses, such as schizophrenia, bipolar disorder and substance use disorders, are among the top ten causes of disability worldwide. Measuring the rising burden related to MI&A is an important step toward ensuring that the needs of people who suffer from these conditions are understood and can be addressed.

12 |

The Institute for Clinical Evaluative Sciences (ICES) is an independent, non-profit organization, whose core business is to conduct research that contributes to the effectiveness, quality, equity and efficiency of health care and health services in Ontario. Public Health Ontario (PHO) has a mandate to support health care providers, the public health system and partner Ministries in making informed decisions and taking informed action to improve the health and security of all Ontarians through the transparent and timely provision of credible scientific advice and practical tools.⁵

In 2009, ICES and PHO began a collaboration focused on the burden of disease in Ontario, a three-year initiative to produce three comprehensive reports on aspects of the burden of disease in Ontario. The first report, the *Ontario Burden of Infectious Disease Study*, was released in December 2010.⁷ It estimated the burden of 51 agents of infectious disease on the life and health of Ontarians. The second report, *Seven More Years: The Impact of Smoking, Alcohol, Diet, Physical Activity and Stress on Health and Life Expectancy in Ontario*, was published in April 2012.⁸ It examined the role of various modifiable risk factors on the life expectancy of Ontarians. *Opening Eyes, Opening Minds*, the present study, is the final report of the series. It evaluates the burden of selected mental illnesses and addictions in Ontario.

The objectives of this study are to:

1. Determine the burden of disease related to mental illness and addictions in Ontario;
2. Inform priority setting, planning and decision-making;
3. Establish a baseline for future evaluation of interventions that impact on the burden of mental illness and addictions;
4. Engage those working in public health in Ontario in a discussion on how to promote positive mental health and prevent mental illness and addictions and their associated health and social harms;
5. Foster a dialogue between those working directly in mental health and public health on the mutual goal of promoting health and wellness for individuals with mental illness and addictions.

Across the health care sector, mental illness and addictions continue to be under-recognized and under-treated.⁹ The public health sector in Ontario has not been as active in addressing the burden of mental illness and addictions as it has in responding to infectious diseases, and more recently, chronic diseases. This may be due in part to the historic separation between mental and physical illness and in part to the lack of attention that mental illness has received from society in general. Mental illness is often perceived as not preventable and, with a few exceptions, there has been neither the resources nor the mandate for public health agencies to work in the area of mental health. As our understanding of the burden of mental illness and addictions comes into focus, the case for a broad mental health promotion and mental illness and addictions prevention strategy becomes stronger. Measuring the burden of illness also provides valuable information for health systems planning and resource allocation to sustain effective treatment, support and secondary prevention programs.

Methods

To compare the relative impacts of diseases/conditions on a population, a method is needed to quantify the burden of each condition using a summary measure of population health. The burden of disease method creates a composite measure that incorporates the burden of morbidity and mortality resulting from each disease, agent or condition.

An Expert Scientific Group of advisors with clinical and research expertise in mental illness and addictions (MI&A) reviewed the methods, data collected and results to ensure plausibility and clinical accuracy. In addition, a Stakeholder Advisory Group provided expertise and contextual insight from the mental health and public health fields in Ontario. Membership in the Stakeholder Advisory Group included frontline public health staff, practicing psychiatrists and researchers. This group also reviewed the methods and results, and was involved in formulating the messaging of the report.

The methods used in this report were adapted from the Ontario Burden of Infectious Disease Study (ONBOIDS),⁷ which incorporated methods from the Global Burden of Disease (GBD) Study and the Population Health Impact of Disease in Canada (PHI) research program.^{10,11}

2.1 DISEASE LIST AND INCLUSION/EXCLUSION CRITERIA

Only those mental illnesses and addictions highly prevalent in the Ontario population were considered for this study. However, the main criterion for inclusion was availability of appropriate data to calculate health-adjusted life years (HALYs). Thus, only conditions that could be readily identified using surveys (the Canadian

Community Health Survey Cycle 1.2 or the CAMH Monitor) or health care utilization data were included. This means that some high-prevalence conditions such as anxiety (beyond social phobia and panic disorders) were not included in the study.

This study is not meant to provide a comprehensive measure of the burden of all MI&A in Ontario. It is a review of a group of selected mental illnesses and addictions that are both readily measured and highly prevalent (Exhibit 2.1). Furthermore, this study examined the burden from incident cases aged 18 to 64 years only, due to limited data measuring the incidence of MI&A in those younger than 18 years. Incident cases in those aged 65 years and older were excluded because the MI&A examined in this study are rarely seen to manifest in the elderly.²¹ The methods used in this study also likely underestimated the mortality attributable to MI&A and do not account for the impact of comorbidity. For all these reasons, the burden estimates for MI&A in this study are conservative and do not reflect the total burden of MI&A in Ontario.

2.2 OUTCOME MEASURES

The health-adjusted life year (HALY) is the unit of measure used in this study. It is a composite health gap measure that allows for the simultaneous description of mortality and morbidity by incorporating deaths occurring before a pre-specified life expectancy (premature

mortality) and the reduced functioning or suboptimal state of health associated with disabilities or diseases.

HALYs are made up of years of life lost due to premature mortality (YLL) and year-equivalents of reduced functioning due to disease or disability (YERF).

Years of Life Lost Due to Premature Mortality (YLL)

YLL measures the years of life lost due to premature mortality (Equation 2.1). It is calculated for each condition by age group and sex. To obtain the YLL for each condition, the number of deaths in an age group and sex from a particular cause is multiplied by L, the standard loss function. L is the life expectancy of each age group and sex. The YLL for each age group is added to yield the YLL for each condition by sex.

$$\text{Equation 2.1:} \\ YLL_{c,a,s} = N_{c,a,s} * L_{a,s}$$

Where:

$N_{c,a,s}$ = number of deaths due to cause (c) for given age (a) and sex (s)

$L_{a,s}$ = standard loss function in years (life expectancy for the age and sex stratum)

Exhibit 2.1

Mental illnesses and addictions examined and their associated health states

MENTAL ILLNESS/ ADDICTION	HEALTH STATE
Agoraphobia	Mild, moderate, severe
Bipolar disorder	Mild, moderate, severe
Major depression	Mild, moderate, severe
Panic disorder	Overall
Schizophrenia	Overall
Social phobia	Mild, moderate, severe
Alcohol use disorders	Overall
Cocaine use disorders	Overall
Prescription opioid misuse	Overall

Year-Equivalents of Reduced Functioning (YERF)

YERF measures the years of healthy life lost due to reduced functioning as a result of a disease or disability (Equation 2.2). The calculation of YERF for each condition required the following steps:

1. A detailed description of the natural history of each condition and its associated health states was created. (Each condition can have multiple health states.)
2. The data needed to calculate each element of YERF were identified and obtained.
 - a) Incidence: The incidence of each condition was estimated using various sources (see Section 2.5 for details). The disease modelling software DisMod II was used to calculate age- and sex-specific incidence rates for conditions where they were not directly available. The incidence rates were calculated using prevalence, case fatality, background mortality and remission rates. Information on the distribution of incident cases by health state was collected from scientific literature.¹²
 - b) Duration: DisMod II was used to estimate the duration using prevalence, case fatality, background mortality and remission rates. Duration estimates were age and sex specific.

c) Severity weight: Severity weights were calculated for each health state. They were assumed to be uniform across age groups and by sex. The weights were determined by experts in the field using the Classification and Measurement System of Functional Health (CLAMES).¹³ The CLAMES tool was developed for the PHI study. (See Appendix A for a description of how severity weights were ascertained.)

3. The YERF for each health state (for each age group and sex) was calculated by multiplying the incident cases by the severity weight and duration and then adding the YERF for the age groups and sexes within each health state.
4. The YERF for each condition was ascertained by adding the YERF from each health state associated with the condition.

Equation 2.2:
$$\text{YERF}_{c,h,s} = I_{c,h,s} * D_{c,h,s} * SW_{c,h}$$

Where:

$I_{c,h,s}$ = incident cases by cause (c), health state (h), age (a) and sex (s)

$D_{c,h,s}$ = average duration by cause (c), health state (h), age (a) and sex (s)

$SW_{c,h}$ = severity weight associated with health state

Health-Adjusted Life Years (HALYs)

HALYs for each condition were calculated by adding the YLL and YERF for the condition.

Equation 2.3:
$$\text{HALY} = \text{YLL} + \text{YERF}$$

The r-HALY measures future healthy years of life lost due to each incident case of disease in an average year. It is thus an incidence-based measure rather than a prevalence-based measure.

Social Value Choices

The calculation of HALYs requires several social value choices (life expectancy, age weighting, discounting and severity weights). The main social value choices were made by the research team in collaboration with the Expert Scientific Group. Since the social value choices differed from traditionally calculated disability-adjusted life years (DALYs) (as seen in the GBD studies), we calculated DALYs in the sensitivity analyses where data for comparison was available. More details can be found in the DALY analysis in Appendix D.

16 |

1. Life expectancy

Life expectancy is the number of years a person could be expected to live from a given age. As detailed in Equation 2.1, the calculation of YLL requires the definition of a standard loss function (L) that represents the average life expectancy for that age group and sex. The standard loss function, and subsequent calculation of YLL, will vary depending on the life expectancy measure used.

In the GBD study, the same predefined life expectancy (by age group and sex) was used for all countries. This was based on the highest attainable life expectancy at the time using the Coale and Demeny West Level 26 model life table.¹⁴ For females, the highest life expectancy at birth was 82.5 years (the life expectancy for females in Japan). For males, a life expectancy at birth was assigned to be 80 years, based on what is thought to be the biological difference between the two sexes (2.5 years).

In this study, the 2001 life expectancy for the Ontario population (82.0 years for females and 77.4 years for males at birth) was used to account for the local demographic profile and to allow comparison with other Ontario burden of disease studies.¹⁵

2. Age weighting

Age weighting is applied in some studies because individuals have different roles and changing levels of dependency and productivity with age.

Therefore, it may be appropriate to consider valuing the time lived at a particular age unequally.¹⁶ The use of age weighting is highly debated and the exact quantitative implementation is controversial¹⁶; ultimately, it was not used in the main analysis of this report.

3. Discounting

When the principle of discounting is applied, future years are assigned less value than those lived today. This is based on the economic concept that one prefers benefits now rather than in the future.¹⁷ However, there are ethical and methodological issues related to discounting. Discounting is disputed because its application results in the apparent lower efficiency of prevention programs. As a result of this debate, studies often present both discounted and undiscounted results. Further, it is unknown if Canadians prefer having access to health benefits in the present as opposed to the future. As such, discounting was not used in this study's main analysis but was used in the calculation of DALYs (in Appendix D).

4. Severity weights

Severity weights (or health state valuations) quantify societal preferences for different health states. These weights do not represent the lived experience of any disability or health state. Rather they quantify societal preferences for health states in relation to the societal 'ideal' of optimal health.¹⁸ The weights for HALY calculation are

expressed on a scale from zero to one, with zero representing a state of optimal health and one representing a state equivalent to death.

Severity weights were developed based on standardized descriptions of disease states using the Classification and Measurement System of Function Health (CLAMES).¹⁹ This methodology was previously developed as part of the PHI study for generating preference scores for the Canadian population.¹³ It used the Standard Gamble methodology with predominantly lay panels (town hall meetings) to capture "society's preferences" for various marker conditions. The results were then used to develop a scoring algorithm. The CLAMES was used as the basic descriptor because its attributes better incorporate the impact of MII&A than other available tools.¹⁹ For example, CLAMES includes attributes, such as emotional state, memory and thinking, social relationships and anxiety, that are important when defining the impact of MII&A.

Disability-Adjusted Life Years (DALYs)

To assess the impact of using HALYs as opposed to DALYs for our study, we computed DALYs (incorporating age weighting, 3% discounting, standard GBD life expectancy and disability weights from previous studies) for the conditions where data were available. The results are found in Appendix D.

2.3 AGE GROUPS

In this study, we did not include incident cases among children under 18 years of age or adults aged 65 years and older. The primary data source for prevalence was the Canadian Community Health Survey Cycle 1.2—Mental Health Focus,³⁰ which only includes those aged 15 years and older. Incident cases in individuals aged 15 to 18 years were excluded because the sample size of the survey data for that age group is quite small. In addition, the CAMH Monitor only includes those 18 years and older. Incident cases among those aged 65 years and older were excluded because the MIRA examined in this study generally develop in young adulthood and are rarely seen to manifest in the elderly.³¹

The following age groups were used for YLL, YERF and HALY calculations: 18–24, 25–34, 35–44, 45–54, 55–64 and 65+*. Although attempts were made to obtain data stratified by these age groups, this was not always possible due to limitations in availability. In such cases, age groups were aggregated.

* In this incident-based methodology, we followed standard cancer unit (death or recovery) thus, cases that developed in younger age groups may still have a burden past age 65 years.

2.4 TIME FRAME

Burden of disease studies generally identify a single year of study for which data are collected and estimates generated. These cases are then theoretically followed into the future to identify the health states they develop and to estimate when they die. In general, MIRA do not have substantial year-to-year variability^{12,32}; however, we obtained average estimates across multiple years (whenever possible) to account for slight annual variations. As seen in Exhibit 2.2, we used the most current years of available data.

2.5 DATA SOURCES

The calculation of HALYs required information concerning mortality, disease incidence, health state distribution, health state duration, and severity weights associated with each health state. These estimates were collected from the following data sources.

Exhibit 2.2
Data sources by year

DATA SOURCE	YEAR(S)
CAMH Monitor	2009
Canadian Community Health Survey, Cycle 1.2	2002
Health care utilization data from:	2000–2010
• Ontario Health Insurance Plan	
• Canadian Institute for Health Information	
• Discharge Abstract Database	
• Same-Day Surgery Database	
• National Ambulatory Care Reporting System	
• Ontario Mental Health Reporting System	
Vital statistics mortality data	2005–2007
National Epidemiologic Survey of Alcohol and Related Conditions (U.S.)	2001–2005
National Survey on Drug Use and Health (U.S.)	2008

The Census of Canada is administered in five-year intervals by Statistics Canada, which collects demographic and socio-economic data on the population.²⁹ Census data from 2001 for Ontario were used to create estimates of life expectancy for the population by the age groups specified in Section 2.3.

Vital Statistics

The Ontario Office of the Registrar General collects mortality data from death certificates completed by physicians. In accordance with legal reporting requirements, registration of deaths is considered to be virtually complete with regard to the fact of death, but the accuracy of the cause of death is variable. Only a single cause of death (also called the underlying cause)—coded using the International Classification of Diseases, 10th Revision (ICD-10)—was available for this study. Unfortunately, unless a disease or condition is identified as the single underlying cause of death, its contribution to a death is not captured.

Mortality records for Ontario residents who died outside of the province are not available. We also excluded deaths of non-residents that occurred in Ontario. The codes used for extracting the mortality data are listed in Appendix B.

Biases in coding of deaths may lead to an under-reporting of deaths due to MI&A. For schizophrenia and bipolar disorder we were able to examine the risk of death in those with and without each condition. This analysis was not part of our main analysis, but served to supplement our knowledge on the risk of death in those with these conditions.

Health Care Utilization Data

Health care utilization data (i.e., records of hospitalizations and emergency department visits, physician billing claims) were used to estimate the prevalence of bipolar disorder and the incidence of schizophrenia. In Ontario, all hospitalizations and medically necessary physician services are freely available under public health care insurance to nearly the entire resident population. New immigrants and migrants, as well as Canadians who have been out of the country for seven months or more, are not covered by Ontario's health insurance plan until three months after moving or returning to Ontario, so their burden may not be fully captured.

Health care utilization data were collected from several large validated databases. Data on hospitalizations and same-day surgeries were extracted from the Canadian Institute for Health Information's Discharge Abstract Database (CIHI-DAD) and Same-Day Surgery (CIHI-SDS) Database, which contain detailed information on diagnoses and procedures for

all acute care hospitalizations and same-day surgeries, respectively. Diagnoses are identified using ICD-10 codes.

Data on visits to emergency departments were obtained from the National Ambulatory Care Reporting System (NACRS). Diagnoses in this dataset were identified using ICD-10 codes.

Data on physician visits were collected from the Ontario Health Insurance Plan (OHIP) physician billing claims database, which contains claims for outpatient clinic visits from approximately 98% of Ontario physicians. The diagnostic codes used in OHIP are generally similar to ICD-9 codes.

Data on hospitalizations in designated mental health beds were collected from the Ontario Mental Health Reporting System (OMHRS) using ICD-10 codes. A list of all ICD-10 and OHIP codes used in this study are listed in Appendix B. A unique identifier (encrypted health card number) allows for de-identified linkage of individuals across datasets.

Canadian Community Health Survey Cycle 1.2

The Canadian Community Health Survey (CCHS) is a cross-sectional survey that collects information related to health status, health care utilization and health determinants for the Canadian population.³⁰ The content for Cycle 1.2 is partly based on a selection of mental disorders from the WMH-CIDI (World Mental Health—Composite International Diagnostic Interview

Instrument). The WMH-CID is a lay-administered psychiatric interview of patients aged 15 years and older that generates a profile of those with a disorder according to the definitions of the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV).²⁴

Results from Ontario respondents were weighted to reflect the total Ontario population.

CCHS Cycle 1.2 was used to estimate prevalence rates for agoraphobia, major depression, panic disorder, social phobia, alcohol use disorders and cocaine use disorders.

CAMH Monitor

The Centre for Addiction and Mental Health's CAMH Monitor is the longest ongoing representative survey of adult substance use in Canada.²⁵ The survey is based on the institutional experience of previous monitoring studies, including the Adult Drug Use series (1977–1991) and the Ontario Alcohol and Other Drugs Opinion Survey series (1992–1995). To enhance comparability, the CAMH Monitor has been designed to maintain many of the features of previous surveys. The survey is administered by the Institute for Social Research at York University.

The 2009 cycle of the CAMH Monitor was based on telephone interviews with 2,037 Ontario adults aged 18 years and older (response rate, 57% of those eligible).

The CAMH Monitor sample design employs a stratified (by six regional area codes), two-stage (telephone number; respondent) list-assisted, random digit dialing, rolling monthly probability selection procedure, which interviews English-speaking household residents of Ontario aged 18 years and older. For each calendar year, the 12 monthly non-overlapping samples are cumulated to provide a single annual data file.

In this study, the CAMH Monitor was used to estimate the prevalence of prescription opioid misuse.

DisMod II

The disease modelling software program DisMod II was used to generate consistent estimates of epidemiological indicators (i.e., prevalence, incidence, remission rates and duration).²⁶ The model is described in Appendix C.

National Epidemiologic Survey of Alcohol and Related Conditions (NESARC)

NESARC is a longitudinal survey with its first wave of interviews fielded in 2001–2002, followed by a second wave in 2004–2005. NESARC is a representative sample of the non-institutionalized U.S. population aged 18 years and older. The first-wave sample comprised 43,093 respondents.²⁷

NESARC collected data on:

- demographic variables
- alcohol consumption
- alcohol abuse and dependence
- alcohol treatment utilization
- family history of alcoholism
- tobacco use and dependence
- medicine use
- drug abuse and dependence
- drug treatment utilization
- family history of drug abuse
- major depression
- family history of major depression
- dysthymia
- mania and hypomania
- panic disorder and agoraphobia
- social phobia
- specific phobia
- anxiety disorder
- personality disorders
- antisocial personality disorder
- family history of antisocial personality disorder
- pathological gambling
- medical conditions
- victimization.

20 |

All diagnoses were established with the a priori-validated Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS) instrument.²⁸ Incidence, remission and duration data were obtained from the National Institute on Alcohol Abuse and Alcoholism using the standard definitions. Overall, the results of NESARC have been published in several hundred scientific papers.

NESARC utilizes a validated tool (the AUDADIS) for diagnosis and is a large population-based study undertaken in a developed nation similar to Canada. Thus, the results should be similar to what we would expect to find in Canada. For most mental illnesses, empirical estimates of prevalence, duration, case fatality and remission were obtained from NESARC.

National Survey on Drug Use and Health (NSDUH)

The NSDUH provides national and state-level data on mental illnesses and the use of tobacco, alcohol and illicit drugs (including non-medical use of prescription drugs) in the United States.

NSDUH is an annual, nationwide survey involving interviews with approximately 70,000 randomly selected individuals aged 12 years and older living in a random sample of households. A professional interviewer makes a personal visit to each one.²⁹

Evidence from Epidemiologic Studies

In order to calculate HAYs, estimates of the incidence of each health state are needed. The list of health states can be found in Exhibit 2.1. If the distribution of cases by health states was not empirically available, epidemiologic studies were used to supplement the data.

Results and Interpretation

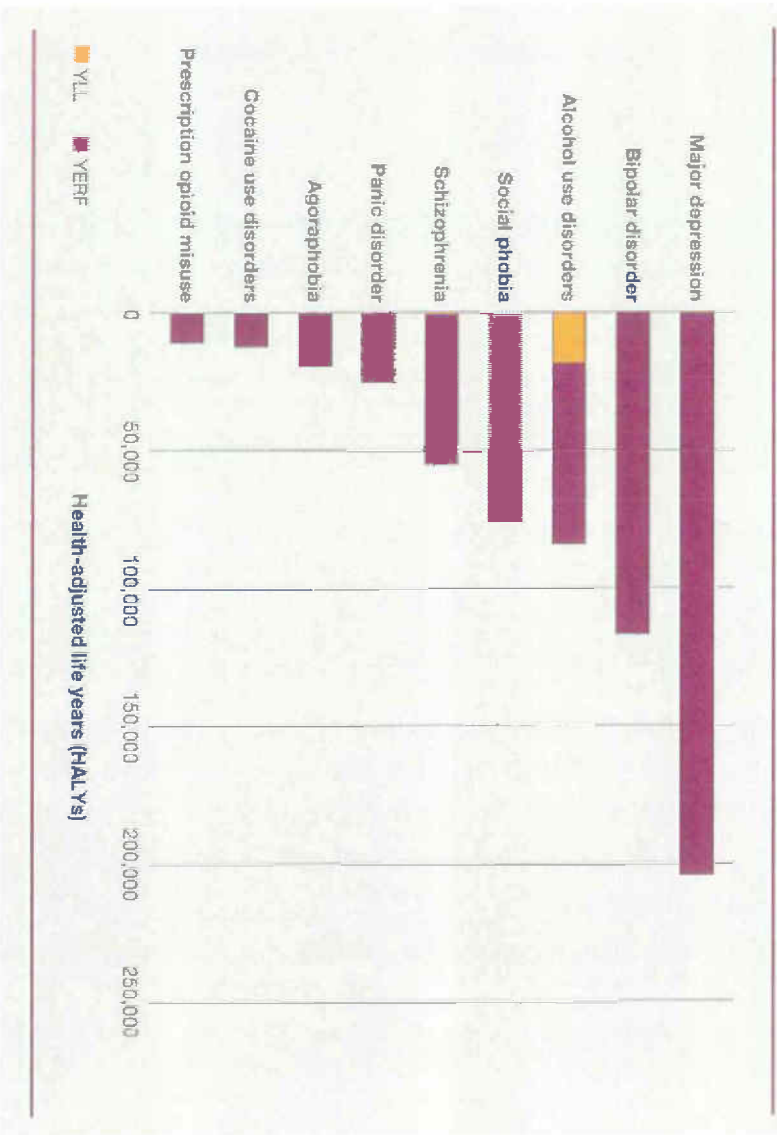
The mental illnesses and addictions (MI&As) selected for this report contributed to more than 600,000 health-adjusted life years (HALYs) lost in Ontario. This is an estimate of future HALYs lost resulting from incident cases of the selected MI&As in an average year.

22 | As illustrated in Exhibit 3.1, the largest

contributor to HALYs was major depression (more than 200,000), followed by bipolar disorder (more than 100,000) and alcohol use disorders (more than 80,000). The smallest contributors, among the conditions examined, was prescription opioid misuse; however, it is important to note that deaths due to this condition were not well captured by the mortality data sources (see Section 4.8 for details).

The vast majority of HALYs were due to YERF; YLL contributed 20,283 (3%) and YERF contributed 583,488 (97%) to overall HALYs. The only condition for which YLL had a significant contribution was alcohol use disorders, where it contributed 22% of HALYs.

Exhibit 3.1
Health-adjusted life years (HALYs) lost for selected mental illnesses and addictions in Ontario, by years of life lost due to premature mortality (YLL) and year-equivalents of reduced functioning (YERF)



3.1 MORTALITY

Alcohol use disorders contributed to the greatest number of deaths (88% of total deaths) and in turn, YLL (91% of total YLL) of the conditions examined (Exhibit 3.2). Overall, YLL and number of deaths were directly correlated; however, there were exceptions. Major depression had a slightly higher average number of deaths than schizophrenia, but schizophrenia had almost twice as many YLL. Compared to major depression, deaths in those with schizophrenia occurred at younger ages, resulting in a greater number of future years of life lost (i.e., higher YLL). Likewise, 87% of deaths due to depression were among those aged 70 years and older, compared to 62% of deaths due to schizophrenia in that age group.

No deaths were attributed to panic disorder, social phobia or agoraphobia. Only two deaths were attributed to prescription opioid misuse, but this outcome is thought to be an under-report of the true mortality burden.³⁰ In the vital statistics data, only the 'underlying cause of death' is readily available. Because some conditions are more likely to be recorded than others, there are biases in how the data is coded. Investigators with the Ontario Drug Policy Research Network reported an average of 383 deaths per year between 2004 and 2006 where the level of opioid in the person's system was high enough to cause death.³⁰

Exhibit 3.2

Number and proportion of deaths and years of life lost due to premature mortality (YLL) for selected mental illnesses and addictions in Ontario, by YLL ranking

RANK	MENTAL ILLNESS/ ADDICTION	NUMBER OF YLL	PERCENTAGE OF YLL	AVERAGE NO. OF DEATHS PER YEAR (2005-2007)	PERCENTAGE OF TOTAL DEATHS
1	Alcohol use disorders	18,465	91.0	762	88.0
2	Schizophrenia	767	3.9	41	4.7
3	Major depression	493	2.4	46	5.3
4	Cocaine use disorders	354	1.7	8	0.9
5	Bipolar disorder	107	0.5	6	0.7
6	Prescription use disorders	77	0.4	2	0.2
7	Agoraphobia	0	0.0	0	0.0
8	Panic disorder	0	0.0	0	0.0
9	Social phobia	0	0.0	0	0.0
	Total	20,283	100.0	865	100.0

In addition, suicides in the reporting period were not redistributed to mental illnesses, as it would be difficult to determine the contribution of each MHA to suicides.

3.2 MORBIDITY

Major depression contributed to the greatest number of YERF among the examined conditions and addictions. However, alcohol use disorders affected the greatest number of individuals, accounting for 42% of incident cases. The difference in ranking occurs because of how YERF is calculated using incidence, duration and severity weights. Major depression has a longer duration and higher severity weights (see Section 4.3 for details), which lead to a higher YERF. Similarly, panic disorder accounted for the second highest number of incident cases but was ranked sixth based on YERF because of its shorter duration and lower severity weight.

3.3 EFFECT OF GENDER

Overall, women contributed a greater number of total HALYs than did men: 320,739 HALYs and 283,033 HALYs, respectively. Further, women contributed a greater number of HALYs for each mental illness, with the exception of schizophrenia (Exhibit 3.4). The opposite was seen for the addictions examined. Compared to women, men contributed approximately 1.5 times the number of HALYs for both prescription opioid misuse and cocaine use

Exhibit 3.3
Number and proportion of incident cases and year-equivalents of reduced functioning (YERF) for selected mental illnesses and addictions in Ontario, by YERF ranking

YERF RANK	MENTAL ILLNESS/ ADDICTION	NUMBER OF YERF	PERCENTAGE OF YERF	NUMBER OF INCIDENT CASES	PERCENTAGE OF TOTAL INCIDENT CASES
1	Major depression	203,970	35.0	55,587	13.8
2	Bipolar disorder	116,814	20.0	42,231	10.5
3	Social phobia	75,368	12.9	20,091	5.0
4	Alcohol use disorders	65,734	11.3	188,834	42.0
5	Schizophrenia	54,409	9.3	5,735	1.4
6	Panic disorder	25,351	4.3	62,796	15.6
7	Agoraphobia	19,235	3.3	4,895	1.2
8	Cocaine use disorders	11,923	2.0	17,282	4.3
9	Prescription opioid misuse	10,684	1.8	24,308	6.1
Total		583,488	100.0	401,539	100.0